

WE CLAIM:

1. A process for producing an industrial chemical, comprising:
providing an isomerization precursor;
5 isomerizing a site of unsaturation in the precursor to produce an isomerized derivative; and
reacting the isomerized derivative with an unsaturated compound in the presence of a metathesis catalyst to produce at least one desired industrial chemical.
- 10 2. The process according to claim 1 where the isomerization precursor is an unsaturated fatty acid or fatty acid derivative.
- 15 3. The process according to claim 2 where the fatty acid or fatty acid derivative is a polyunsaturated fatty acid.
4. The process according to claim 1 where the metathesis catalyst is a ruthenium-based catalyst.
- 20 5. The process according to claim 2 where isomerizing the fatty acid or fatty acid derivative includes contacting the fatty acid or fatty acid derivative with an enzyme.
6. The process according to claim 1 where isomerizing produces a conjugated diene derivative.
- 25 7. The process according to claim 6 where the conjugated diene derivative is a conjugated linoleic acid.
- 30 8. The process according to claim 7 where the conjugated linoleic acid is 18:2 Δ9,11 linoleic acid.

9. The process according to claim 1 where reacting the isomerized derivative produces at least one compound selected from the group consisting of butadiene, 1-octene, 9-decenoic acid, derivatives thereof, and combinations thereof.

5 10. The process according to claim 2 where reacting the fatty acid or fatty acid derivative with an unsaturated compound produces at least one compound selected from the group consisting of butadiene, 1-octene, 9-decenoic acid, derivatives thereof, and combinations thereof.

10 11. The process according to claim 10 where reacting the fatty acid or fatty acid derivative with an unsaturated compound produces 1-octene.

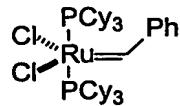
12. A process for producing 1-octene, comprising:
providing linoleic acid or a derivative thereof;
15 enzymatically isomerizing a site of unsaturation in the linoleic acid or derivative thereof to produce an isomerized linoleic acid or isomerized lower ester of linoleic acid; and
reacting the isomerized linoleic acid or isomerized lower ester of linoleic acid with a metathesis catalyst in the presence of ethylene, thereby producing 1-octene.
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13. The process according to claim 12 where the isomerized linoleic acid is $\Delta 9,11$ -octadecadienoic acid.

25 14. The process according to claim 13 where $\Delta 9,11$ -octadecadienoic acid is esterified to provide a lower alkyl ester prior to reacting with ethylene in the presence of a metathesis catalyst.

30 15. The process according to claim 12 where the metathesis catalyst is a ruthenium-based catalyst.

16. The process according to claim 15 where the metathesis catalyst is



17. The process according to claim 12 where the linoleic acid is derived
5 from soybean oil.

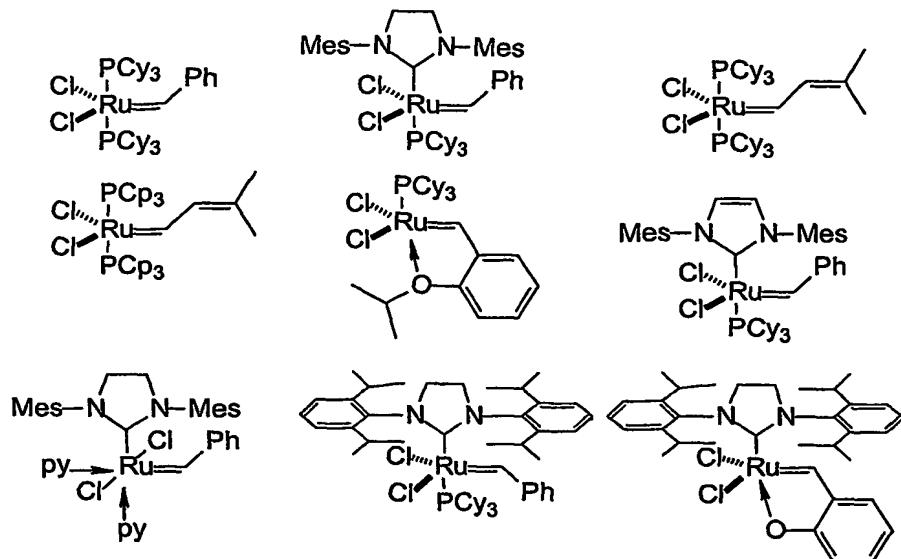
18. A process for producing 1-octene, comprising:
providing linoleic acid from soybean oil;
contacting the linoleic acid with a linoleate isomerase to produce $\Delta 9,11$ -
10 octadecadienoic acid;
esterifying the $\Delta 9,11$ -octadecadienoic acid to produce a lower alkyl ester;
and
contacting the ester with a metathesis catalyst in the presence of ethylene,
thereby producing 1-octene.

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19. The process according to claim 18 where contacting the ester with a
metathesis catalyst in the presence of ethylene produces a 9-decenoate ester.

20. The process according to claim 18 where the catalyst is a ruthenium-
20 based catalyst.

21. The process according to claim 20 where the catalyst is selected
from the group consisting of



22. A process for producing 1-octene, comprising:

providing a fatty acid diene or an ester thereof;

5 converting the fatty acid diene or the ester thereof to vaccenic acid or an ester thereof; and

contacting the vaccenic acid or an ester thereof with a metathesis catalyst in the presence of ethylene, thereby producing 1-octene.

10 23. A method for making 1-octene, comprising:

providing $\Delta 9,11$ -octadecadienoic acid or a derivative thereof; and

contacting the $\Delta 9,11$ -octadecadienoic acid the derivative thereof with a metathesis catalyst in the presence of ethylene, thereby producing 1-octene.

15 24. The method according to claim 23 where $\Delta 9,11$ -octadecadienoic acid or a derivative thereof is provided as an ester or a salt of $\Delta 9,11$ -octadecadienoic acid.

20 25. The method according to claim 24 where providing comprises providing a lower alkyl ester of octadecadienoic acid.

26. The method according to claim 25 where the ester is a methyl ester.

27. The method according to claim 23 where the method produces 9-decenoic acid.

5 28. The method according to claim 23 where the metathesis catalyst is a ruthenium-based catalyst.

29. The method according to claim 23 where the metathesis catalyst is selected from the group consisting of

